# GENERAL INDEX[1]

## A


Absorption, and distribution of phosphorus by the tomato plant, influence of phosphorus supply and form of available nitrogen on, 495
by excised roots, glass potometers for study of, 170
ionic, by tomato plants as correlated with composition of the nutrient medium, 258
of carbon dioxide, and carbohydrate formation, concurrency of during photosynthesis, 394
of carbon dioxide by maize, 278
of energy, and growth of *Chlorella pyrenoidosa*, 587
of salts, by mycorrhizae, 453
of sulphur dioxide, by alfalfa and sugar beets, 212
Abstract service, natural and synthetic fibers, edited by MILTON HARRIS and H. MARK, 390
Accelerators, of ion absorption, by excised barley roots, calcium and polyvalent cations as, 466
Accumulation, ion, by excised barley roots, calcium and polyvalent cations as accelerators of, 466
of salt, by excised roots, 34
of sugar, effect on $CO_2$ absorption, 287
*Achillaea millefolium*, exudation of glutamine from, 2
Acid, ascorbic, concentration in vegetable varieties, 615
ascorbic, in electrodialyzed pea seeds, 28
ascorbic, in pineapple plants supplied with nitrate or ammonium salts, effects of iron on, 52
monochloracetic, use to include ammonia in the "soluble nitrogen" tissue test, 562
removed by electrodialysis, 24
treatment, effect on rate of formation of free fatty acids in stored cottonseed, 310
Acidity, in pineapple plants supplied with nitrate or ammonium salts, effects of iron on, 52
Acids, effects of, on spectroscopic analysis of chlorophylls *a* and *b*, 632
fatty, effect of moisture, acid and alkali treatments of cottonseed, on the rate of formation of, 310
Active emanation, relation of to respiration in the avocado fruit, 519
Activity, enzyme, effect of boron, copper, manganese, and zinc on, in tomato and alfalfa, 105
Address, change of, editor-in-chief, 387
Advances, in enzymology, edited by F. F. NORD and C. H. WERKMAN, 715
Agricultural chemistry, source book of, by C. A. BROWNE, 565
*Agropyron smithii*, growth and carbohydrate responses of, to changes in nitrogen supply, 481
Air, carbon dioxide content of, 287
Air temperatures, growth responses of hemp to differential soil and, 294
*Aleurites fordii*, 694
Alfalfa, absorption of sulphur dioxide by, 212
enzyme activity of, effect of boron, copper, manganese, and zinc on, 105
Alkali, removed by electrodialysis, 24
treatment, effect on rate of formation of free fatty acids in stored cottonseed, 310
ALTSCHUL, A. M., Effect of moisture and of treatments with acid and alkali on rate of formation of free fatty acids in stored cottonseed, 310
Ammonia, in the "soluble nitrogen" tissue test, use of monochloracetic acid to include, 562
Ammonium salts, effects of iron on pineapple plants supplied with, 52
Analysis, chemical, of cucumber, 642
soil and plant, by C. S. PIPER, 714
statistical, in biology, by K. MATHER, 177
Analytical considerations, chlorophylls *a* and *b*, 627
*Ananas comosus*, effects of iron on chlorophyllous pigments, ascorbic acid, acidity, and carbohydrates of, 52


[1] Papers published in PLANT PHYSIOLOGY are indexed in The Agricultural Index, The W. H. WILSON Co., New York.

Anatomy, gross, of cucumber, 639
ANDERSON, DONALD B., Osmotic quantities in growing cotton bolls, 338
Annual election, twenty-first, 564
Annual meeting, 387, 709
Annual review, of biochemistry, 714
of physiology, 567
Aplectrum, mycorrhizal symbiosis in, 440
wanted, 388
Apparatus, for controlled environment, 92
for cryoscopy of tissue sap, 545, 546
for determination of free fatty acids, 311
for measuring carbon dioxide absorption, 279
for measuring photosynthesis and respiration, 681
for measuring root respiration, 700
for sand culture work, 704
for studies of absorption and exudation of excised roots, 171
for study of electrical and curvature responses of Avena coleoptiles, 199
for study of relation of weather conditions to onion blast, 143
for treating plants with natural gas, 552
Apparent equilibrium, between photosynthesis and respiration, in unrenewed atmosphere, 370
Apparent photosynthesis, in some conifers during winter, 179
Apple blossoms, sugars in, 603
Apple fruit, transpiration, physical characters of skin in relation to, 529
Applications, heavy, of gypsum, effect of on plant growth, 706
Ascorbic acid, concentration in vegetable varieties, 615
in electrodialyzed pea seeds, 28
in pineapple plants supplied with nitrate or ammonium salts, effects of iron on, 52
Asparagus, growth of, effects of light on, 125
Aster, China, photoperiodic responses with intermittent irradiation, 8
Atmosphere, unrenewed, apparent equilibrium photosynthesis and respiration in, 370
Auxins, in mycorrhizae, 448
Available nitrogen, form of, influence on nitrogen metabolism, of tomato, 649
form of, influence on absorption and distribution of phosphorus by the tomato plant, 495
Avena coleoptiles, electrical and curvature responses of, 199
Avocado fruit, respiration, relation of active emanation to, 519
Awards, CHARLES REID BARNES life membership, to N. G. CHOLODNY and WALTER THOMAS, 174
to GEORGE W. SCARTH, 709
STEPHEN HALES, committee, 174
award to RAY FIELDS DAWSON, 710

B

BAILEY, L. F., Effect of boron, copper, manganese, and zinc on the enzyme activity of tomato and alfalfa plants grown in the greenhouse, 105
Barley, physiological responses of, effect of oxygen tension on, 33
roots, excised, calcium and polyvalent cations as accelerators of ion accumulation by, 466
sulphur metabolism of, a study, using radioactive sulphur, 227
BARNES, CHARLES REID, memorial life membership awards, 174, 709
BARR, C. G., Evaluation of foliage injury and water loss in connection with use of wax and oil emulsions, 90
BARRENTINE, MELLE WARD, Ionic absorption by tomato plants as correlated with variations in the composition of the nutrient medium, 258
Bean, kidney, light and pigment development in, 569
BEAR, FIRMAN E., SIR JOHN RUSSELL, 391
Beets, carotene and ascorbic acid concentration of, 622
sugar, absorption of sulphur dioxide by, 212
BEESON, KENNETH C., Ionic absorption by tomato plants as correlated with variations in the composition of the nutrient medium, 258
BENEDICT, H. M., The growth and carbohydrate responses of *Agropyron smithii* and *Bouteloua gracilis* to changes in nitrogen supply, 481
BIALE, J. B., Relation of the production of an active emanation to respiration in the avocado fruit, 519

Bibliography, of minor elements, 714
Bindweed, growth of, effects of light on, 125
Biochemistry, annual review of, 714
Biology, statistical analysis in, by K. MATHER, 177
Blast, onion, relation of weather conditions to, 139
Blossom-end rot, of tomato fruit, effect of nutrient ratio and concentration on, 671
Blossoms, apple and cherry, sugars in, 603
BOGUSCH, E. R., Isolation in unialgal cultures of lichen gonidia by a simple plasmolysis tehnique, 559
Bolls, cotton, growing, osmotic quantities in, 338
Boron, effect on enzyme activity of tomato and alfalfa, 90
  supply, effect on chemical composition, of tomato leaflets, 404
BREON, W. S., Influence of phosphorus supply and the form of available nitrogen on the absorption and the distribution of phosphorus by the tomato plant, 495
  Influence of phosphorus supply and the form of available nitrogen on the nitrogen metabolism of the tomato plant, 649
Bougainvillea, effect of natural gas on, 556
*Bouteloua gracilis*, growth and carbohydrate responses of, to changes in nitrogen supply, 481
BREWER, GEORGE E. F., Buffer values of the leaves of some plants, 164
BRYNER, LOREN C., A study of the sulphur metabolism of wheat, barley, and corn using radioactive sulphur, 227
Bryophyllum, buffer values, of leaves of, 167
Bromine accumulation, tomato plants, 510
BROWN, G. B., The growth and carbohydrate responses of *Agropyron smithii* and *Bouteloua gracilis* to changes in nitrogen supply, 481
BROWNE, C. A., Source book of agricultural chemistry, 565
Buffer capacity, of leaves, effect of absorption of sulphur dioxide on, 212
Buffer values, of leaves of some plants, 164

C

Calcium, 263
  as accelerator of ion accumulation, by excised barley roots, 466
  determination, rapid method, 81
Calcium/potassium relations, in lime induced chlorosis, 425
*Cannabis sativa*, 294
Capacity, buffer, of leaves, effect of sulphur dioxide on, 212
Carbohydrate, elaboration of, 455
  formation, concurrency of, and carbon dioxide absorption, during photosynthesis, 394
  of pineapple plants supplied with nitrate or ammonium salts, effects of iron on, 52
  responses, of *Agropyron smithii* and *Bouteloua gracilis*, to changes in nitrogen supply, 481
Carbon dioxide, absorption, and carbohydrate formation, concurrency of during photosynthesis, 394
  absorption by maize, 278
  and growth of *Chlorella pyrenoidosa*, 585
  evolution, and production of active emanation, in avocado fruit, 521
  production, and electrodialysis, 23
Carbon metabolism, growth factors and, 454
Carnation, effect of natural gas on, 555
Carotene, concentration, in vegetable varieties, 615
  content, of eighteen tobacco varieties, 689
Carrots, carotene and ascorbic acid concentration of, 623
Castor bean, growth of, effects of light on, 126
Catalase, determination of, 106
Cations, polyvalent as accelerators of ion accumulation, by excised barley roots, 466
Cellulose, in pineapple plants, 68
Change, of address, editor-in-chief, 387
Changes, in chemical composition of tung kernels, during germination, 694
  in nitrogen supply, growth and carbohydrate responses of *Agropyron smithii* and *Bouteloua gracilis* to, 481
Characters, physical, of apple skin, in relation to fruit respiration, 529

Chemical composition, of roots and tops of dioecious Lychnis, in vegetative and flowering phases of growth, 377
of tomato leaflets, effect of boron supply on, 404
of tung kernels, changes in during germination, 694
Chemical reactions, of sulphur dioxide, after absorption by alfalfa and sugar beets, 212
Chemistry, agricultural, source book of, by C. A. BROWNE, 565
Cherry blossoms, sugars in, 603
CHILDERS, N. F., A method of measuring root respiration, 699
*Chlorella pyrenoidosa*, growth under various culture conditions, 579
Chlorella sp., cultivation of, 359
Chlorophyll, content, of eighteen tobacco varieties, 689
Chlorophyllous pigments, in pineapple plants, 52
Chlorophylls, *a* and *b*, spectroscopic stability of, 627
Chlorosis, lime-induced, nutrient interrelations in, 420
CHOLODNY, N. G., Award of CHARLES REID BARNES life membership to, 174
CHUCKA, J. A., Effect of nutrient ratio and concentration on growth and composition of tomato plants and on the occurrence of blossom-end rot of fruit, 671
Cleveland meeting, 564
program, 565
Coacervates, 458
Coating, waxy, and apple fruit transpiration, 534
Coleoptile, Avena, electrical and curvature responses of, 199
*Coleus blumei*, buffer values of leaves, 167
yellow green, effects of natural gas on, 554
COMAR, C. L., Evaluation of foliage injury and water loss in connection with use of wax and oil emulsions, 90
Spectroscopic stability of chlorophylls *a* and *b* and certain analytical considerations, 627
Committee, executive, meeting, 173
life membership, 565
program, 387
Composition, of fruits and phloem exudate of cucurbits, 326
of nutrient medium, ionic absorption by tomato plants correlated with, 258
of tomato plants, effect of nutrient ratio and concentration on, 671
Composition, chemical, of potato tubers, in relation to hair sprouts, 190
of roots and tops of dioecious Lychnis in vegetative and flowering phases of growth, 377
of tomato leaflets, effect of boron supply on, 404
of tung kernels, changes in during germination, 694
Concentration, of carotene and ascorbic acid, in vegetable varieties, 615
of nutrient, effect on growth and composition of tomato plants, and on blossom-end rot of fruit, 671
Concurrency, of carbohydrate formation and $CO_2$ formation, during photosynthesis, 394
Conditions, culture, growth of *Chlorella pyrenoidosa* under, 579
weather, relation of to onion blast, 139
Conifers, apparent photosynthesis of, during winter, 179
Constituents, inorganic, rapid analytical method for, 76
Content, chlorophyll and carotene, of eighteen tobacco varieties, 689
Copper, effect on enzyme activity of tomato and alfalfa, 90
Corallorhiza, mycorrhizal symbiosis in, 440
Corn, growth of, effects of light on, 118
effects of shading on, 120
effects of dry weather on, 123
mesocotyl, light and elongation of, 537
sulphur metabolism of, a study of, using radioactive sulphur, 227
*Cornus florida*, 350
Cotton, bolls, growing, osmotic quantities of, 338
plant, growth cycle of, sugar movement to roots, mineral uptake and, 507
Cottonseed, stored, effect of moisture and of treatments with acid and alkali on rate of formation of free fatty acids in, 310
CRAFTS, A. S., Fruit growth and food transport in cucurbits, 131
Composition of fruits and phloem exudate of cucurbits, 326

Cryoscopy, of small amounts of expressed sap, 544
Cucumber, growth and reproduction of, effect of daylength on, 638
*Cucurbita pepo*, 328
Cucurbits, composition of fruits and phloem exudate, 326
fruit growth and food transport in, 131
Culture, conditions, growth of *Chlorella pyrenoidosa* under, 579
sand, a simple apparatus for, 704
unialgal, isolation in, of lichen gonidia, 559
Cultivation, injury to roots by, determined by root pressures, 157
of Chlorella sp., 359
CURRIER, H. B., Cryoscopy of small amounts of expressed tissue sap, 544
CURTIS, LAWRENCE C., The exudation of glutamine from lawn grass, 1
Curvature responses, of Avena coleoptiles, 199
Cuticle, thickness of, and apple fruit transpiration, 531
Cyclamen, effect of natural gas on, 554
Cycle, growth, of the cotton plant, sugar movement to roots, mineral uptake and, 507
Cytochemistry, of hyphae, 446

## D

DANIELSON, L. L., Effect of daylength on growth and reproduction of the cucumber, 638
DAVIS, A. R., Effects of oxygen tension on certain physiological responses of rice, barley, and tomato, 33
DAWSON, RAY FIELDS, STEPHEN HALES award to, 710
Daylength, effect on growth and reproduction of cucumber, 638
DECKER, JOHN P., Relation between light intensity and rate of photosynthesis of loblolly pine and certain hardwoods, 350
Effect of temperature on photosynthesis and respiration in red and loblolly pines, 679
Deficiency, mineral, in pine, 590
Defruited tomato plants, growth of, 509
Depletion, of $CO_2$, effect upon absorption, 289
Development, evolutionary, of mycorrhizae, 443
pigment, in kidney bean, light and, 569
Dioecious Lychnis, chemical composition of roots and tops of, in vegetative and flowering phases, 377
Discs, cut, of radish roots, effect of disc thickness on respiration and nitrogen fractions of, 660
Disc thickness, of radish roots, effect on respiration and nitrogen fractions, 660
Distribution, anatomical, of hair sprouts on potato tubers, 186
and absorption of phosphorus, by the tomato plant, influence of phosphorus supply and form of available nitrogen on, 495
of sulphur* in wheat, 245
of radiosulphur at harvest, 238
Douglas fir, buffer values of leaves, 167
DUFRENOY, J., Mycorrhizal symbiosis in Aplectrum, Corallorhiza and Pinus, 440
DUSTMAN, R. B., Sugars in apple and cherry blossoms, 603

## E

EATON, FRANK M., Sugar movement to roots, mineral uptake, and the growth cycle of the cotton plant, 507
Ectendotrophic mycorrhiza, of Monterey pine, 445
Editor-in-chief, appointment, 710
change of address of, 387
Elaboration, of carbohydrates, 455
Election, annual, twenty-first, 564
Electrical responses, Avena coleoptiles, 199
Electrodialysis of seeds, 19
Elements, minor, bibliography of, 714
Elongation, of the mesocotyl of corn, light and, 537
Emanation, active, relation of to respiration in avocado fruit, 519
EMMERT, E. M., Use of monochloracetic acid to include ammonia in the "soluble nitrogen" tissue test, 562
Emulsions, oil, evaluation of foliage injury and water loss in connection with use of, 90
Endophytic mycorrhizae, of Corallorhiza, 441
Energy absorption, and growth of *Chlorella pyrenoidosa*, 587
ENGARD, CHARLES J., Organogenesis in Rubus, 716

Enzyme activity, of tomato and alfalfa, effect of boron, copper, manganese and zinc on, 105
Enzymology, advances in, edited by F. F. NORD and C. H. WERKMAN, 715
Equilibrium, apparent, between photosynthesis and respiration, in an unrenewed atmosphere, 370
Errata, 176, 716
Error, sampling, 616
Estimation, semi-micro, of reducing sugars, 148
Excised barley roots, calcium and polyvalent cations as accelerators of ion acumulation by, 466
Excised roots, absorption and exudation by, glass potometers for study of, 170
Executive committee, meeting, 173
Expressed tissue sap, cryoscopy of small amounts of, 544
Extracts, plant, stability of, 631
Exudate, phloem, of cucurbits, composition of fruits and, 326
Exudation, by excised roots, glass potometers for study of, 170
of glutamine by lawn grass, 1

F

Fatty acids, free, in stored cottonseed, effect of moisture, and acid and alkali treatments, on rate of formation of, 310
Fibers, natural and synthetic, abstract service, edited by MILTON HARRIS and H. MARK, 390
Fig, Hottentot, a possible commercial source of tannin, 384
Financial stability, 710
FISH, V. B., Sugars in apple and cherry blossoms, 603
FLINT, LEWIS H., Light and the elongation of the mesocotyl in corn, 537
Flowering, and vegetative phases of growth, dioecious Lychnis, chemical composition of tops and roots in, 377
Flowering plants, is natural gas injurious to, 551
Foliage injury, evaluation of, in connection with use of wax and oil emulsions, 90
Food, and food products, edited by MORRIS B. JACOBS, 715
Food transport, and fruit growth, in cucurbits, 131
Form, of available nitrogen, influence on absorption and distribution of phosphorus by the tomato plant, 495
influence on nitrogen metabolism of tomato, 649
Formation, carbohydrate, concurrency of, and of carbon dioxide absorption during photosynthesis, 394
of free fatty acid in cottonseed, effect of moisture, acid and alkali treatments, on rate of, 310
Fractionation, leaf, in lime-induced chlorosis, 427
of sulphur, 216
Fractions, nitrogen, of cut discs of radish roots, effect of disc thickness on, 660
FREELAND, R. O., Apparent photosynthesis of some conifers during winter, 179
Fruit, apple, transpiration, physical characters of skin in relation to, 529
avocado, relation of production of active emanation to respiration in, 519
tomato, blossom-end rot of, effect of nutrient ratio and concentration on, 671
Fruit growth, and food transport, in cucurbits, 131
Fruits, and phloem exudate of cucurbits, composition of, 326

G

GARDNER, JOSEPHINE, The carotene and ascorbic acid concentration of vegetable varieties, 615
Gas, natural, is it injurious to flowering plants, 551
Germination, and electrodialysis, 21
of tung kernels, changes in chemical composition during, 694
seed, effect of natural gas on, 556
GILLAM, W. S., Influence of phosphorus supply and the form of available nitrogen on the absorption and the distribution of phosphorus by the tomato plant, 495
Influence of phosphorus supply and the form of available nitrogen on the nitrogen metabolism of the tomato plant, 649

Glass potometers, for study of absorption and exudation by excised roots, 170
Glutamine, exudation of, by lawn grass, 1
GODAR, EDITH, Buffer values of the leaves of some plants, 164
GOLDSMITH, GLENN WARREN, obit., 711
Gonidia, lichen, isolation of, in unialgal cultures, 559
Grafting experiments, hair sprout of potatoes, 187
Grass, lawn, exudation of glutamine by, 1
Greenhouse experiments, on effects of boron, copper, manganese, and zinc on enzyme activity of tomato and alfalfa, 105
GRIFFIEH, R. B., Chlorophyll and carotene content of eighteen tobacco varieties, 689
Growing cotton bolls, osmotic quantities in, 338
Growth, and carbohydrate responses, of *Agropyron smithii* and *Bouteloua gracilis*, to changes in nitrogen supply, 481
cycle, of the cotton plant, sugar movement to roots, mineral uptake and, 507
fruit, of cucurbits, and food transport, 131
of *Chlorella pyrenoidosa*, under various culture conditions, 579
of cucumber, effect of daylength on, 638
of plants, in drained and submerged soil, 39
of plants in water culture, 43
of plants, relation of light to, 117
of tomato plants, effect of nutrient ratio and concentration on, 671
plant, effect of heavy applications of gypsum on, 706
Growth-factors, and carbon metabolism, 454
Growth responses, of hemp, to differential soil and air temperatures, 294
vegetative, and flowering phases of, dioecious Lychnis, chemical composition of roots and tops in, 377
GUSTAFSON, F. G., Is natural gas injurious to flowering plants, 551
Gypsum, heavy applications of, effect on plant growth, 706

## H

Hair sprout, of potatoes, 186
HALES, STEPHEN, award committee, 174
award to RAY FIELDS DAWSON, 710
HAMM, P. C., Hair sprout of potatoes, 186
Hardwoods, relation between light intensity and rate of photosynthesis of, 350
HARLEY, C. P., Nutrient interrelations in lime-induced chlorosis, 420
HARRIS, D. G., Spectroscopic stability of chlorophylls *a* and *b* and certain analytical considerations, 627
HARRIS, MILTON, Natural and synthetic fibers, abstract service, 390
HARRISON, BERTRAND F., Radioautographs showing the distribution of sulphur* in wheat, 245
HARVEY, R. B., Hair sprout of potatoes, 186
*Helianthus annuus*, 93
buffer value of leaves, 167
Hemicelluloses, of pineapple plants, 64
Hemp, growth responses of, to differential soil and air temperatures, 294
HENDRICKS, RUSSEL H., Some chemical reactions of sulphur dioxide after absorption by alfalfa and sugar beets, 212
A study of the sulphur metabolism of wheat, barley and corn using radioactive sulphur, 227
Apparent equilibrium between photosynthesis and respiration in an unrenewed atmosphere, 370
HILL, GEO. R., Some chemical reactions of sulphur dioxide after absorption by alfalfa and sugar beets, 212
A study of the sulphur metabolism of wheat, barley and corn using radioactive sulphur, 227
Radioautographs showing the distribution of sulphur* in wheat, 245
Apparent equilibrium between photosynthesis and respiration in an unrenewed atmosphere, 370
Histochemical map, of mycorrhizae, 457
HOAGLAND, D. R., Lectures on the inorganic nutrition of plants, 389
HOBBS, CLINTON H., Studies on mineral deficiency in pine, 590
HOOD, S. L., Some effects of boron supply on the chemical composition of tomato leaflets, 404
Hottentot fig, a possible commercial source of tannin, 384

HUM, THOMAS YORT, The Hottentot fig as a possible commercial source of tannin, 384
Hyphae, cytochemistry of, 446

I

Impurities, solvent, spectroscopic effects of, 632
Injurious, is natural gas, to flowering plants, 551
Injury, foliage, evaluation of in connection with use of wax and oil emulsions, 90
to roots, use of root pressures in determining, 157
Inorganic plant nutrition, by D. R. HOAGLAND, 389
Intensity, light, and $CO_2$ absorption, 282
and rate of photosynthesis of loblolly pine and certain hardwoods, 350
Intermittent irradiation, effect on photoperiodic responses, 6
Interrelations, nutrient, of lime-induced chlorosis, 420
Invertase, determination of, 110
Ion accumulation, by excised barley roots, calcium and polyvalent cations as accelerators of, 466
Ionic absorption, by tomato plants, correlated with composition of the nutrient medium, 258
Iron, deficiency, leaf fractionation in, 431
effect on pigments, ascorbic acid, acidity, and carbohydrates of pineapple supplied with nitrate or ammonium salts, 52
Irradiation, intermittent, effect on photoperiodic responses, 6
Isolation, of unialgal cultures, of lichen gonidia, 559

J

JACOBS, MORRIS B., Foods and food products, 715
JEFFREY, R. N., Chlorophyll and carotene content of eighteen tobacco varieties, 689
JOHAM, HOWARD E., Sugar movement to roots, mineral uptake, and the growth cycle of the cotton plant, 507
JOHNSTON, JR., FREDERICK A., Changes in chemical composition of tung kernels during germination, 694
JONES, LINUS H., Relation of weather conditions to onion blast, 139

K

*Kalanchoe pinnata*, buffer values of leaves, 167
*Kalanchoe tubiflora*, effect of natural gas on, 554
KARON, M. L., Effect of moisture and of treatments with acid and alkali on rate of formation of free fatty acids in stored cottonseed, 310
Kernels, tung, changes in chemical composition of, during germination, 594
KERR, THOMAS, Osmotic quantities in growing cotton bolls, 338
Kidney bean, light and pigment development in, 569
Kinetics, of formation of free fatty acids, 317
KRAMER, PAUL J., Relation between light intensity and rate of photosynthesis of loblolly pine and certain hardwoods, 350

L

Labile sulphur, in alfalfa, 218
LARSON, RUSSELL E., The carotene and ascorbic acid concentration of vegetable varieties, 615
Lawn grass, exudation of glutamine from, 1
Leaf storage, effect on chlorophyll analysis, 631
Leaflets, tomato, effects of boron supply on chemical composition of, 404
Leaves, buffer capacity of, effect of sulphur dioxide on, 212
buffer values, of some plants, 164
sunflower, concurrency of carbohydrate formation and $CO_2$ absorption during photosynthesis in, 394
LEHNER, BERNICE, Hair sprout of potatoes, 186
Lenticels, and apple fruit transpiration, 532
LEONARD, O. A., Use of root pressures in determining injury to roots by cultivation, 157
Levulose, determination of, 605
Lichen gonidia, isolation of in unialgal cultures, 559
Life membership, CHARLES REID BARNES awards, to N. G. CHOLODNY and WALTER THOMAS, 174
committee, 565
to GEORGE W. SCARTH, 709
Light, and elongation of the mesocotyl in corn, 537

and pigment development in the kidney bean, 569
relation to the growth of plants, 117
Light intensity, and $CO_2$ absorption, 282
and rate of photosynthesis in loblolly pine and certain hardwoods, 350
Lignin, in pineapple plants, 69
Lime-induced chlorosis, nutrient interrelations in, 420
LINDNER, R. C., Rapid analytical methods for some of the more common inorganic constituents of plant tissues, 76
Nutrient interrelations in lime-induced chlorosis, 420
LIPMAN, CHARLES BERNARD, obit., 713
Loblolly pine, photosynthesis and respiration in, effect of temperature, 679
relation between light intensity and rate of photosynthesis of, 350
LOEHWING, WALTER F., appointed editor-in-chief, 710
LOOMIS, W. E., Relation of light to growth of plants, 117
Absorption of carbon dioxide by maize, 258
Effect of heavy applications of gypsum on plant growth, 406
LORENZ, O. A., Fruit growth and food transport in cucurbits, 131
Composition of fruits and phloem exudate of cucurbits, 326
Loss, water, evaluation of in connection with use of wax and oil emulsions, 90
Lychnis, dioecious, chemical composition of roots and tops of, in vegetative and flowering phases, 377
LYON, C. B., Ionic absorption by tomato plants as correlated with variations in the composition of the nutrient medium, 258
Some effects of boron supply on the chemical composition of tomato leaflets, 404

## M

MACDOUGAL, D. T., Mycorrhizal symbiosis in Aplectrum, Corallorhiza and Pinus, 440
Magnesium, 270
deficiency symptoms in pine, 599
determination, rapid method, 82
Maize, absorption of carbon dioxide by, 278
Manganese, effect of, on enzyme activity, of tomato and alfalfa, 105
MANUEL, MILDRED E., Cultivation of Chlorella sp., 359
Map, histochemical, of mycorrhizae, 441
Marigold, effect of natural gas on, 555
MARK, H., Natural and synthetic fibers, abstract service, 390
MATHER, K., Statistical analysis in biology, 177
MCHARGUE, J. S., Effect of boron, copper, manganese, and zinc on the enzyme activity of tomato and alfalfa grown in the greenhouse, 105
Measurements, of water loss, 95
Measuring, root respiration, method of, 699
Mechanical stimuli, electrical and curvature responses of Avena coleoptile to, 199
Media, changes in, and growth of *Chlorella pyrenoidosa*, 582
Medium, nutrient, variations in composition of, correlated with ionic absorption by tomato plants, 258
Meeting, annual, 387, 709
Cleveland, 564
Executive committee, 173
Membership, CHARLES REID BARNES life, awards to N. G. CHOLODNY and WALTER THOMAS, 174
to GEORGE W. SCARTH, 709
committee, 565
*Mesembryanthemum eduli*, possible source of commercial tannin, 384
Mesocotyl, of corn, light and the elongation of, 537
Metabolism, and polyvalent cation effect, 472
nitrogen, of tomato, influence of phosphorus supply and available form of nitrogen on, 649
phosphorus, in mycorrhizae, 451
rate and kind, in relation to calcium effect, 475
sulphur, of wheat, barley, and corn, a study of, using radioactive sulphur, 227
Metals, traces of, colorimetric determinations of, by E. B. SANDELL, 566
Method, for measuring root respiration, 699
Methods, rapid analytical, for common inorganic constituents of plant tissues, 76
Mineral deficiency, in pine, 590
Minerals, loss of, by electrodialysis, 27

Mineral uptake, and growth cycle of the cotton plant, 507
Minor elements, bibliography of, 714
Moisture, effect on rate of formation of free fatty acids in stored cottonseed, 310
Monochloracetic acid, use of, to include ammonia in the "soluble nitrogen" tissue test, 562
Morphogenesis, of mycorrhizae, 441
Movement, of sugar to roots, and the growth cycle of the cotton plant, 507
Mutative origination, of stem-mycorrhizae, in Aplectrum, 443
Mycorrhizal symbiosis, in Aplectrum, Corallorhiza and Pinus, 440
MYERS, JACK, The growth of *Chorella pyrenoidosa* under various culture conditions, 579

N

Natural, and synthetic fibers, abstract service, edited by MILTON HARRIS and H. MARK, 390
Natural gas, is it injurious to flowering plants, 551
NELLY, JOHN D., Electrodialysis of seeds, 19
NELSON, CLARENCE H., Growth responses of hemp to differential soil and air temperatures, 294
Nitrate, effects of iron on pineapple plants supplied with, 52
Nitrogen, 273
  accumulation, tomato plants, 512
  deficiency in pine, 594
  determination, rapid method, 78
  form of available, influence on absorption and distribution of phosphorus by the tomato plant, 495
  form of available, influence on nitrogen metabolism of tomato, 649
  fractions, of cut discs of radish roots, effect of disc thickness on, 660
  metabolism of tomato, influence of phosphorus supply and form of available nitrogen on, 649
  soluble, tissue test, use of monochloracetic acid to include ammonia, 562
  supply, changes in, growth and carbohydrate responses of *Agropyron smithii* and *Bouteloua gracilis* to, 481
NOECKER, NORBERT L., Translation of W. H. SCHOPFER, plants and vitamins, 176
NORD, F. F., Advances in enzymology, 715
Nutrient, interrelations, in lime-induced chlorosis, 420
  medium, variations in composition of, correlated with ionic absorption by tomato plants, 258
  ratio, effect on growth and composition of tomato plants, and on blossom-end rot of fruit, 671
Nutrition, inorganic plant, by D. R. HOAGLAND, 389

O

Occurrence, of blossom-end rot, tomato fruit, effect of nutrient ratios and concentration on, 671
Oil emulsions, evaluation of foliage injury and water loss in connection with use of, 90
Onion blast, relation of weather conditions to, 139
Organic compounds, absorption of, by roots, 454
Organogenesis, in Rubus, by CHARLES J. ENGARD, 716
Osmotic quantities, in growing cotton bolls, 338
OWENS, GERALDINE, The carotene and ascorbic acid concentration of vegetable varieties, 615
Oxidase, activity, identification of sites of, 447
  determination of, 108
Oxygen tension, effects on physiological responses of rice, barley, and tomato, 33

P

PADDICK, M. E., A simple apparatus for sand culture work, 704
PARKS, R. Q., Some effects of boron supply on the chemical composition of tomato leaflets, 404
Peas, carotene and ascorbic acid concentration of, 620
  electrodialysis of, 21
PEPKOWITZ, LEONARD P., The carotene and ascorbic acid concentration of vegetable varieties, 615
Peppers, carotene and ascorbic acid concentration of, 617
Peroxidase, determination of, 107
Phases, of growth, vegetative and flowering, dioecious Lychnis, chemical composition of roots and tops in, 377

Phloem exudate, and fruit of cucurbits, composition of, 326
Phosphorus, 272
absorption and distribution of by tomato plant, influence of phosphorus supply on, 495
deficiency symptoms in pine, 596
determination, rapid method, 79
metabolism, in mycorrhizae, 451
supply, influence on absorption and distribution of phosphorus by the tomato plant, 495
supply, influence on nitrogen metabolism, of tomato, 649
Photoperiodic responses, effect of intermittent irradiation on, 6
Photosynthesis, and respiration, apparent equilibrium between, in an unrenewed atmosphere, 370
apparent, of some conifers during winter, 179
concurrency of carbohydrate formation and carbon dioxide absorption during, 394
of red and lobolly pines, effect of temperature on, 679
rate of, of loblolly pine and certain hardwoods, relation between light intensity and, 350
Physical characters, of apple skin, in relation to fruit transpiration, 529
Physiology, annual review of, 567
plant, in Russia, 388
Pieniazek, S. A., Physical characters of the skin in relation to apple fruit transpiration, 529
Pigments, chlorophyllous, effect of iron on, in pineapple plants supplied with nitrate or ammonium salts, 52
development of, light and, in the kidney bean, 569
Pine, loblolly, relation between light intensity and rate of photosynthesis of, 350
mineral deficiency in, 590
Pines, red and loblolly, effect of temperature on photosynthesis and respiration of, 679
Pinus, mycorrhizal symbiosis in, 440
*Pinus echinata*, 591
*mariana*, 181
*nigra* var. *austriaca*, 181
*resinosa*, 591
*rigida*, 591
*strobus*, 591
*sylvestris*, 181
*taeda*, 350
Piper, C. S., Soil and plant analysis, 714
Plant, and soil analysis, by C. S. Piper, 714
cotton, growth cycle of, sugar movement to roots, mineral uptake and, 507
extracts, stability of, 631
nutrition, inorganic, by D. R. Hoagland, 389
physiology, in Russia, 388
sensitive, effect of natural gas on, 555
tissues, inorganic constituents, rapid analytical methods for, 76
tomato, influence of phosphorus supply and form of available nitrogen on absorption and distribution of phosphorus in, 495
tomato, nitrogen metabolism of, influence of phosphorus supply and form of available nitrogen on, 649
Plants, and vitamins, by W. H. Schopfer, translated by N. L. Noecker and W. J. Robbins, 176
flowering, is natural gas injurious to, 551
growth of, relation of light to, 117
leaves of, buffer values, 164
tomato and alfalfa, effect of boron, copper, manganese, and zinc on enzyme activity of, 105
tomato, effect of nutrient ratio and concentration on growth and composition of, 671
tomato, ionic absorption in, correlated with the composition of the nutrient medium, 258
Plasmolysis technique, isolation in unialgal cultures of lichen gonidia by, 559
Plastids, 450
*Polygonum convolvulus*, 125
Polyvalent cations, as accelerators of ion absorption, by excised barley roots, 466
Porosity, of leaves, relation to carbon dioxide absorption, 285
Portrait, Sir Edward John Russell, frontispiece, July, opp. p. 391
Postponement, of Tottingham memorial, 565

Potassium, 268
accumulation of, tomato plants, 512
deficiency symptoms, in pine, 597
determination, rapid method, 80
Potato, buffer values of leaves, 167
Potatoes, hair sprout of, 186
Potometers, glass, for studies of absorption and exudation by excised roots, 170
PRATT, HARLAN K., Relation of the production of an active emanation to respiration in the avocado fruit, 519
PRATT, ROBERTSON, The Hottentot fig as a possible commercial source of tannin, 384
Pressures, root, use in determining injury to roots, 157
Production, of active emanation by avocado, relation to respiration of fruit, 519
Products, food, foods and, edited by MORRIS B. JACOBS, 715
Program, Cleveland, 565
Program committee, 387
*Pseudotsuga taxifolia*, buffer values of leaves, 167
Pyridoxin, test for, 450

## Q

Quantities, osmotic, in growing cotton bolls, 338
*Quercus alba*, 350
*borealis maxima*, 350

## R

Radioactive sulphur, a study of sulphur metabolism of wheat, barley and corn by using, 227
Radioautographs, showing the distribution of sulphur* in wheat, 245
Radiosulphur, distribution at harvest, 238
recovery in vegetation, 232
Radish, roots, cut discs, effect of disc thickness on respiration of, and nitrogen fractions, 660
RALEIGH, S. M., Effect of nutrient ratio and concentration on growth and composition of tomato plants and on the occurrence of blossom-end rot of the fruit, 671
Rate, of formation of free fatty acids in cottonseed, effect of moisture and acid and alkali treatments on, 310
of photosynthesis, and light intensity, relation between, in loblolly pine and certain hardwoods, 350
variation in, of $CO_2$ absorption, 280
Ratio, nutrient, and concentration, effect on growth and composition of tomato plants, and on blossom-end rot of fruit, 671
Reactions, chemical, of sulphur dioxide, after absorption by alfalfa and sugar beets, 212
Recovery, of radiosulphur in vegetation, 232
Red pine, photosynthesis and respiration in, effect of temperature, 679
Reducing sugars, determination of, 601
semi-micro estimation, 148
REICHENBERG, A., Hair sprout of potatoes, 186
Reproduction, of cucumber, effect of day-length on, 638
Respiration, and photosynthesis, apparent equilibrium between, in an unrenewed atmosphere, 370
and salt accumulation by excised and intact roots, 34
in avocado fruit, relation of production of active emanation to, 519
in red and loblolly pines, effect of temperature on, 679
of cut discs of radish roots, effect of disc thickness on, 660
root, a method of measuring, 699
Responses, carbohydrate, of *Agropyron smithii* and *Bouteloua gracilis* to changes in nitrogen supply, 481
electrical and curvature, of Avena coleoptiles, 199
growth, of hemp, to differential soil and air temperatures, 294
photoperiodic, effect of intermittent radiation on, 6
physiological, effect of oxygen tension on, 33
Review, annual, of biochemistry, 714
of physiology, 567
Rice, physiological responses of, effect of oxygen tension on, 33
ROBBINS, W. J., Translation of W. H. SCHOPFER, plants and vitamins, 176
Root, pressures, use in determining injury to roots, 157
respiration, a method of measuring, 699

Roots, and tops of dioecious Lychnis, chemical composition of, in vegetative and flowering phases, 377
excised and intact, salt accumulation and respiration of, 34
excised barley, calcium and polyvalent cations as accelerators of ion accumulation by, 466
excised, glass potometers for study of absorption and exudation by, 170
injury to, use of root pressures in determining, 157
movement of sugar to, and growth cycle of the cotton plant, 507
radish, cut discs, effect of disc thickness on respiration and on nitrogen fractions, 660
ROSENE, H. F., Glass potometers for studies of absorption and exudation by excised roots, 170
Rot, blossom-end, of tomato fruit, effect of nutrient ratio and concentration on, 671
Rubus, organogenesis in, by CHARLES J. ENGARD, 716
*Rumex acetosella*, exudation of glutamine from, 2
RUSSELL, SIR JOHN, biographical sketch, 391
note concerning, 565
portrait, frontispiece, July
Russeting, and apple fruit transpiration, 533
Russia, plant physiology in, 388

## S

SAÏD, HUSEIN, The effect of disc thickness on the respiration and the various nitrogen fractions of cut discs of radish roots immersed in water and sugar solutions, 660
Salts, absorption of, by mycorrhizae, 453
ammonium, effect of iron on pineapple plants supplied with, 52
Sampling error, 616
Sand culture work, a simple apparatus for, 704
SANDELL, E. B., Colorimetric determination of metals, 566
Sap, expressed tissue, cryoscopy of small amounts of, 544
SCARTH, GEORGE W., CHARLES REID BARNES life membership award to, 709
SCHRANK, A. R., Relation between electrical and curvature responses in the Avena coleoptile to mechanical stimuli, 198
Seed, germination, effect of natural gas on, 556
Seeds, electrodialysis of, 19
SELL, HAROLD M., Changes in chemical composition of tung kernels during germination, 694
Semi-micro estimation of reducing sugars, 148
Sensitive plant, effect of natural gas on, 555
Service, abstract, natural and synthetic fibers, by MILTON HARRIS and H. MARK, 390
war, 175
SHISHINY, EL, E. D. H., The effect of disc thickness on the respiration and the various nitrogen fractions of cut discs of radish roots immersed in water and sugar solutions, 660
SIDERIS, C. P., Effects of iron on chlorophyllous pigments, ascorbic acid, acidity, and carbohydrate of *Ananas comosus* (L.) Merr. supplied with nitrate or ammonium salts, 52
Skin, apple, physical character of, in relation to fruit transpiration, 529
SMITH, J. H. C., Concurrency of carbohydrate formation and carbon dioxide absorption during photosynthesis in sunflower leaves, 394
Snapdragon, effect of natural gas on, 554
Sodium sulphate*, preparation and application, 229
Soil, and plant, analysis, by C. S. PIPER, 714
drained and submerged, growth of plants in, 39
temperatures, growth responses of hemp to differential air and, 294
*Solanum tuberosum*, buffer values of leaves, 167
Soluble nitrogen tissue test, use of monochloracetic acid to include ammonia in, 562
Solutions, sugar, respiration and nitrogen fractions of cut discs of radish roots immersed in, effect of disc thickness, 660
Source, possible commercial, of tannin, Hottentot fig, 384

Soybean, biloxi, photoperiodic responses with intermittent irradiation, 8
Mukden, photoperiodic responses with intermittent irradiation, 11
Spectroscopic stability, of chlorophylls *a* and *b*, 627
Spinach, Nobel, photoperiodic responses with intermittent irradiation, 8
Spiraea, genetically yellow, leaf fractination in, 431
Sprout, hair, of potatoes, 186
Stability, financial, 710
spectroscopic, of chlorophylls *a* and *b*, 627
Standardization, of cryoscopic apparatus, 547
STANFIELD, J. FISHER, Chemical composition of roots and tops of dioecious Lychnis in vegetative and flowering phases of growth, 377
Starch, in pineapple plants, 63
synthesis, 456
Statistical analysis, in biology, by K. MATHER, 177
Stimuli, mechanical, electrical and curvature responses of Avena coleoptiles to, 199
Stock, effect of natural gas on, 556
Storage, leaf, effect on chlorophyll analysis, 631
Sucrose, determination of, 606
in pineapple plants, 63
Sugar, accumulation, effect of, on $CO_2$ absorption, 287
beets, absorption of sulphur dioxide by, 212
movement to roots, and growth cycle of the cotton plant, 507
solutions, respiration and nitrogen fractions of cut discs of radish roots immersed in, effect of disc thickness, 660
Sugars, in apple and cherry blossoms, 603
reducing, in pineapple plants, 61
reducing, semi-micro estimation of, 148
total, in pineapple plants, 59
Sulphur, 273
dioxide, chemical reaction of, after absorption by alfalfa and sugar beets, 212
fractionation, 217
metabolism, of wheat, barley and corn, study of using radioactive sulphur, 227
radioactive, study of sulphur metabolism of wheat, barley and corn using, 227
Sulphur*, dioxide, preparation and application, 229
in wheat, radioautographs showing distribution of, 245
Sunflower, buffer values of leaves, 167
effect of natural gas on, 554
leaves, concurrency of carbohydrate formation and carbon dioxide absorption during photosynthesis in, 394
Supply, boron, effect on chemical composition of tomato leaflets, 404
nitrogen, changes in, growth and carbohydrate responses of *Agropyron smithii* and *Bouteloua gracilis* to, 481
phosphorus, influence on absorption and distribution of phosphorus by the tomato plant, 495
phosphorus, influence on nitrogen metabolism of tomato, 649
Swainsonia, effect of natural gas on, 556
Symbiosis, mycorrhizal, in Aplectrum, Corallorhiza, and Pinus, 440
Symptoms, of mineral deficiency in pine, 593
Synthesis, of starch, 456
Synthetic and natural fibers, abstract service, edited by MILTON HARRIS and H. MARK, 390

T

Tannin, a possible commercial source of, Hottentot fig, 384
Technique, simple plasmolysis, isolation in unialgal cultures of lichen gonidia by, 559
Temperature, and $CO_2$ absorption, 284
effect on photosynthesis and respiration in red and loblolly pines, 679
Temperatures, differential soil and air, growth responses of hemp to, 294
TENDAM, D. J., Influence of phosphorus supply and the form of available nitrogen on the absorption and the distribution of phosphorus by the tomato plant, 495
Tension, oxygen, effect on physiological responses of rice, barley, and tomato, 33

Test, tissue, "soluble nitrogen," use of monochloracetic acid to include ammonia in, 562
Thickness, disc, effect on respiration and nitrogen fractions, of cut discs of radish roots, 660
THOMAS, MOYER D., Some chemical reactions of sulphur dioxide after absorption by alfalfa and sugar beets, 212
A study of the sulphur metabolism of wheat, barley, and corn using radioactive sulphur, 227
Radioautographs showing the distribution of sulphur* in wheat, 245
Apparent equilibrium between photosynthesis and respiration in an unrenewed atmosphere, 370
THOMAS, WALTER, award of CHARLES REID BARNES life membership to, 174
THUT, H. F., Relation of light to growth of plants, 117
Tissue sap, expressed, cryoscopy of small amounts of, 544
Tissue test, "soluble nitrogen," use of monochloracetic acid to include ammonia in, 562
Titration curves, buffer values of leaves, 165
Tobacco, eighteen varieties, chlorophyll and carotene content of, 689
Tomato, effect of natural gas on, 553
enzyme activity of, effect of boron, copper, manganese, and zinc on, 105
leaflets, effect of boron supply on composition of, 404
nitrogen metabolism of, influence of phosphorus supply and form of available nitrogen on, 649
physiological responses of, effect of oxygen tension on, 33
plant, influence of phosphorus supply and form of available nitrogen on absorption and dsitribution of phosphorus in, 495
plants, effect of nutrient ratio and concentration on growth and composition of, 671
plants, ionic absorption in, correlated with composition of the nutrient medium, 258
Tops, and roots of dioecious Lychnis, chemical composition of, in vegetative and flowering phases, 377
TOTTINGHAM, WILLIAM EDWARD, obit., 387
Traces, of metals, colorimetric determination of, by E. B. SANDELL, 566
Transpiration, apple fruit, physical characters of the skin in relation to, 529
Transport, food, and fruit growth in cucurbits, 131
Tulip, effect of natural gas on, 555
Tung kernels, changes in chemical composition of, during germination, 694

U

Unialgal cultures, isolation in, of lichen gonidia, 559
Uptake, mineral, and the growth cycle of the cotton plant, 507

V

VALLEAU, W. D., Chlorophyll and carotene content of eighteen tobacco varieties, 689
Values, buffer, of leaves of some plants, 164
Variations, in nutrient medium, ionic absorption by tomato plants correlated with, 258
Varieties, eighteen tobacco, chlorophyll and carotene content of, 689
Vegetable varieties, concentration of carotene and ascorbic acid in, 615
Vegetative and flowering phases of growth, dioecious Lychnis, chemical composition of roots and tops in, 377
VERDUIN, J., Absorption of carbon dioxide by maize, 278
VIETS, JR., FRANK G., Calcium and polyvalent cations as accelerators of ion accumulation by excised barley roots, 466
Vitamin $B_1$, test for, 450
Vitamins, plants and, by W. H. SCHOPFER, translated by N. L. NOECKER and W. J. ROBBINS, 176
VLAMIS, J., Effects of oxygen tension on certain physiological responses of rice, barley, and tomato, 33

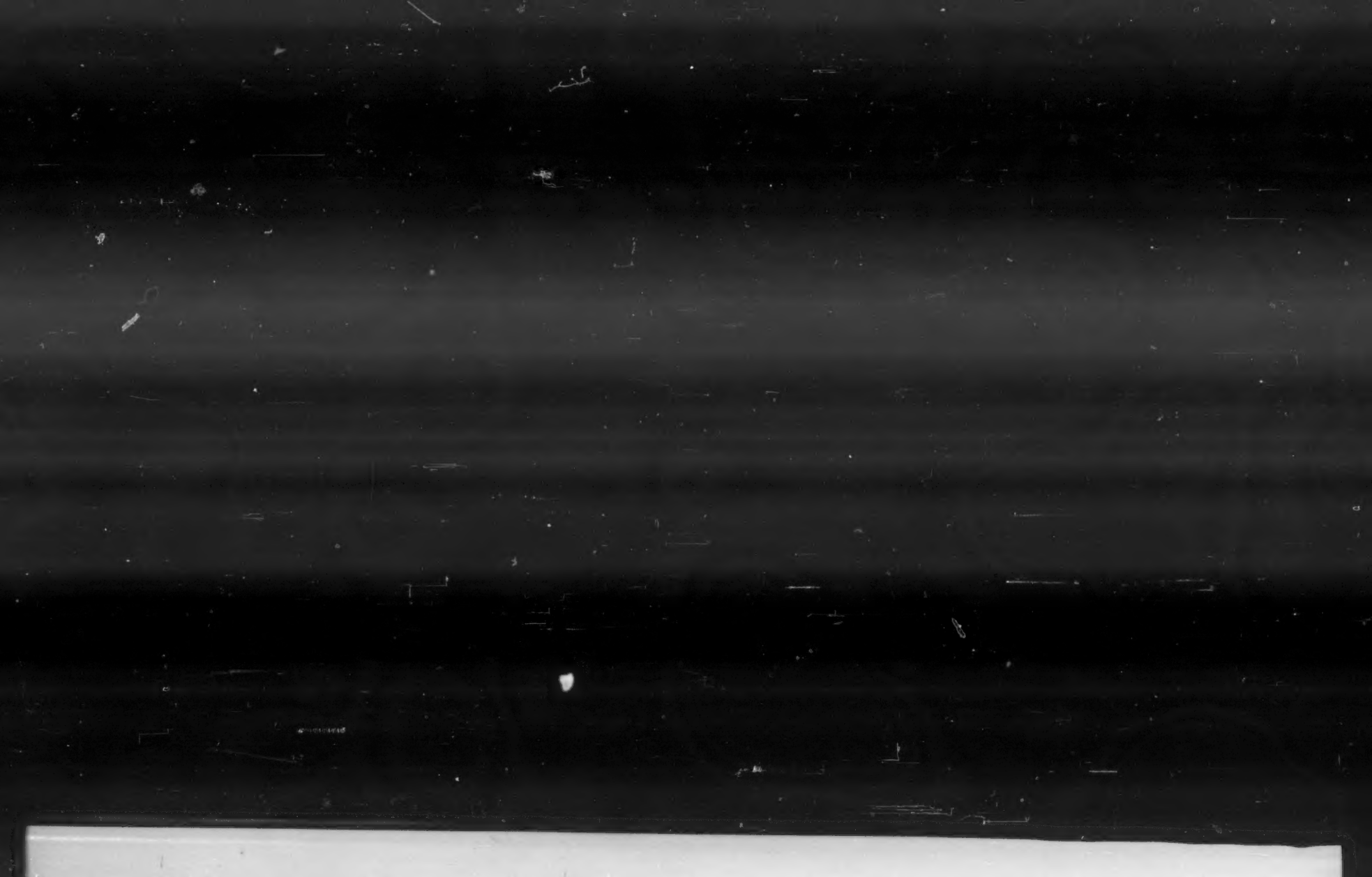
W

Wandering jew, buffer values of leaves, 167
Wanted, Aplectrum, 388
War service, 175

Water, cut discs of radish roots immersed in, effect of disc thickness on respiration and nitrogen fractions of, 660
loss, evaluation of, in connection with use of wax and oil emulsions, 90
Wax, evaluation of foliage injury and water loss, in connection with use of, 90
Waxy coating, and apple fruit transpiration, 534
Weather conditions, relation to onion blast, 139
WEINMANN, H., Semi-micro estimation of reducing sugars, 148
WERKMAN, C. H., Advances in enzymology, 715
Wheat, distribution of sulphur* in, radioautographs showing, 245
sulphur metabolism of, a study of, by using radioactive sulphur, 227
WHITE, DAVID G., A method of measuring root respiration, 699
WHITMORE, ROBERT A., Light and pigment development in the kidney bean, 569
Wilting, effect of, on carbon dioxide absorption, 285
Winter, apparent photosynthesis of conifers during, 179
WITHROW, ALICE P., Effect of intermittent irradiation on photoperiodic responses, 6
WITHROW, R. B., Effect of intermittent irradiation on photoperiodic responses, 6
Work, sand culture, a simple apparatus for, 704

## Y

YOUNG, H. Y., Effects of iron on chlorophyllous pigments, ascorbic acid, acidity and carbohydrates of *Ananas comosus* (L.) Merr. supplied with nitrate or ammonium salts, 52

## Z

*Zea mays*, growth of, effects of light on, 118
*Zebrina pendula*, buffer values of leaves, 167
Zinc, effect of, on enzymatic activity of tomato and alfalfa, 105
ZSCHEILE, F. P., Spectroscopic stability of chlorophylls *a* and *b* and certain analytical considerations, 627